

Amendment and Response

Applicant: Johannis Cornelis Slabbekoom et al.

Serial No.: 10/587,883

Filed: July 27, 2006

Attorney Docket No.: CGL04/0034US01

Title: PROTEIN CONCENTRATE AND AN AQUEOUS STREAM CONTAINING WATER-SOLUBLE CARBOHYDRATES

REMARKS

By this Reply and Amendment, Claims 8, 14, 15, 19, 22-26, 30-35, and 38-41 are cancelled. Claims 1-7, 9-13, 16-18, 20-21, 27-29, 36-37, and 42 are currently amended. Claims 43-50 are newly presented. Accordingly, Claims 1-7, 9-13, 16-18, 20-21, 27-29, 36-37, and 42-50 are currently pending.

In the Specification

In the Specification, in sections [0050], [0060] and [0071] the term “ β -amylase” has been replaced for clarity with the term “ α -amylase”. Support for the amendments is found in the priority document EP04250558.6, filed February 03, 2004.

In the Claims

In the Claims, dependent Claims 43-50 have been newly presented. Support for these claims is present in the Specification at least as follows:

For new dependent Claims 43-44 see Specification at section [0031], reciting: “The carbohydrases used can be any enzyme that can facilitate the degradation (such as either saccharification and/or liquefaction) of a complex carbohydrate to a water-soluble carbohydrate. For example, enzymes such as α -amylases, glucoamylases, dextrinases, pullulanases, hemicellulases, and cellulases or mixtures can be used. . . . Mixtures of glucoamylase and pullulanase can be further used in a saccharification step after liquefaction to further degrade the starch polymers up to about 95-97DE, which contain greater than 90% of the total sugars (DP 1-14) with a composition of at least 90% sugars of DP 1-4.”

For new dependent Claims 45 and 48 see Specification at section [0017], reciting: “Another aspect of the invention provides compositions comprising greater than 70%, 80%, or 90% com protein concentrate and a carbohydrate profile wherein at least 10% of the DP 1-13 sugars are DP 5-13 (methodology provided below). Accordingly, compositions wherein at least 20%, 30%, 35%, 40%, and 55% of the DP 1-13 sugars are DP 5-13 are also provided. The DP 1-13 sugars are α 1-4 linked dextrose.

For new dependent Claims 45-47 see Specification at sections [0131]-[0132], reciting: “TABLE 14-2 Sugar profile of water extractable residuals in cake Composition of Water Extractable Sugars, Higher Sugars, and Oligosaccharides as Cake + Cake + Starch summed area % of peaks DP 1-13 Water Liquefact DP 1-4 (total 1-4/total area 1-

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13) 30.8% 45.3% DP 5-13 (total 5-13/total area 1-13) 69.2% 54.7%. . . . The concentrated protein cake produced from the liquefied and filtered gluten mixture contained a mixture of water extractable residual sugars and higher sugars/oligosaccharides that were below 13 dp. These sugars and higher sugars and oligosaccharides were primarily remnants of the starch liquefaction process that remained in the cake after filtrations. The lower protein cake produced from the Cake+Starch Liquefact contained a higher proportion 1-4 DP sugars as compared to 5-13 DP higher sugars/oligosaccharides residing within the cake that were extractable with water. In comparison, the protein concentrate made from a mixture of gluten cake and water contained an even higher proportion of extractables with DP 5-13. . . ."

For new dependent Claims 49-50 see Specification at sections [0107]-[0108], reciting: "Each of the gluten mixtures was liquefied with alpha-amylase. To each portion of the gluten mixture a sufficient amount of 10% (w/w) sodium hydroxide was added to adjust the pH of the gluten to 6.0. . . . The remaining six mixtures were cooled to 60 degree. C. in a cold water bath and a sufficient amount of 11% sulfuric acid was added to each mixture to adjust the pH to 4.2."

Claim Rejections under 35 USC § 102

Claims 1-21, 26-29 and 31-42 under 35 U.S.C. 102(b) have been rejected as being anticipated by Keim (U.S. Patent Application No. 4,361,651). The Examiner stated:

Claims are drawn to processes for wet-mill streams in order to separate protein therefrom. . . . Keim teaches processes for wet-mill streams in order to separate protein therefrom. See abstract and examples. . . . The claims are identical to the cited disclosure and, are therefore, considered to be anticipated by the teachings therein. . . . Applicant's arguments filed July 19, 2010, have been fully considered but they are not persuasive. The argument that Keim is directed to a wet milling process is noted, however, the disclosure specifically teaches that the dry milling is envisaged by their invention as well. The reference specifically discloses that high protein concentrate is desired, note figure 1. Keim may indeed teach other embodiments, however, protein is clearly disclosed to be available for recovery from the disclosed process which encompasses all of the claimed steps, including carrying out the steps under sulfur dioxide conditions. Keim specifically disclose that removal of starch increases the protein concentration and the protein is recovered, note col. 5, lines 55-65. The claims are anticipated by the teachings of the reference and the rejection is sustained.

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Keim is directed to a process where "sugars are fermented to ethanol" (Keim at Abstract). In order to maximize generation of alcohol, Keim "differs from the standard procedure (where starch is sought as the prime product)" of the traditional wet milling process (Keim at col. 6, lines 26-28) through a shorter period of steeping so "there is less solubilization of starch and protein" and so "carbohydrates and proteins that would otherwise be solubilized are now available for recovery as alcohol and gluten respectively" (Keim at col. 6, lines 32-37). Keim follows a specific sequence which includes liquefying starch and then removing fiber, in order to increase carbohydrates for conversion into alcohol. See Keim at col. 7, lines 1-13 (emphasis added), which provides:

[C]onvert all or essentially all of the starch to fermentable sugars, remove all or essentially all the carbohydrates and protein from the fiber, and to remove the fiber from the system; then to remove the protein from the system in a highly purified state. This is accomplished by the successive steps of (1) liquefying and saccharifying the starch, (2) screening out the fiber and washing it free of adhering materials by counter-current washing with water low in solubles, (3) removing the remaining insoluble material (primarily protein) by centrifugal or other means, followed by dewatering (with or without washing) and drying.

Since Keim is directed to recovering carbohydrates for recovery of alcohol, these carbohydrates are not available for recycling or reintroduction to the protein stream of Keim.

Even though Keim discloses use of enzymes, these enzymes are used to saccharify degermed grain before the fiber has been removed from the degermed grain and before the starch is separated from the protein. See Keim at col. 7, lines 20-68 through col. 8, lines 1-19 (emphasis added):

(1) In the acid conversion method, the starch slurry is cooked at an elevated temperature in the presence of strong acid. . . . In the acid-[enzyme] method, liquefaction is carried out with alpha-amylase and saccharification with glucoamylase (2) After the saccharification step, the carbohydrates may be easily washed from the fiber, carrying other solubles and finely divided insolubles, including the protein, with them. . . . After washing, the fiber is dewatered and may be dried separately or in combination with

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concentrated steepwater to produce Corn Gluten Feed. . . . (3) The liquid remaining after removal of the washed fiber is a solution consisting of fermentable sugars and small amounts of other solubles such as inorganic salts and protein. Suspended in this are insoluble substances such as protein (primarily) These insoluble substances are removed by centrifugal methods (4) After removal of the insolubles, the solution consists essentially of sugars

In contrast to Keim, independent Claims 1 and 20 (as amended) are directed to “a continuous process for producing a protein concentrate” and require, among other elements, “separating the starch-protein mixture thereby producing a starch fraction and a protein fraction” and subsequently “adding carbohydrase to the protein fraction” and subsequently “separating protein-containing materials from the aqueous stream enriched with the water-soluble carbohydrates” and subsequently “contacting the aqueous stream enriched with the water-soluble carbohydrates with the starch-protein mixture,” which is not identically disclosed in Keim. Accordingly, independent Claims 1 (as amended) (and corresponding dependent Claims 2-7, 9-13, and 16-18) and independent Claim 20 (as amended) (and corresponding dependent Claims 21, 27-29, 36-37, and 42-50) are patentable in view of Keim.

CONCLUSION

In view of the foregoing remarks, Applicants submit that this claimed invention, as amended, is neither anticipated nor rendered obvious in view of the prior art references applied against this application. Applicants therefore request the entry of this Reply and Amendment, the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

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Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 50-2342.

Respectfully submitted,

Dated: April 15, 2011

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